



Assessing water resources adaptive capacity to climate change impacts in the Pacific Northwest Region of North America

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Abstract:

Climate change impacts in Pacific Northwest Region of North America (PNW) are projected to include increasing temperatures and changes in the seasonality of precipitation (increasing precipitation in winter, decreasing precipitation in summer). Changes in precipitation are also spatially varying, with the northwestern parts of the region generally experiencing greater increases in cool season precipitation than the southeastern parts. These changes in climate are projected to cause loss of snowpack and associated streamflow timing shifts which will increase cool season (October-March) flows and decrease warm season (April-September) flows and water availability. Hydrologic extremes such as the 100 year flood and extreme low flows are also expected to change, although these impacts are not spatially homogeneous and vary with mid-winter temperatures and other factors. These changes have important implications for natural ecosystems affected by water, and for human systems. The PNW is endowed with extensive water resources infrastructure and well-established and well-funded management agencies responsible for ensuring that water resources objectives (such as water supply, water quality, flood control, hydropower production, environmental services, etc.) are met. Likewise, access to observed hydrological, meteorological, and climatic data and forecasts is in general exceptionally good in the United States and Canada, and access to these products and services is often supported by federally funded programs that ensure that these resources are available to water resources practitioners, policy makers, and the general public. Access to these extensive resources support the argument that at a technical level the PNW has high capacity to deal with the potential impacts of natural climate variability on water resources. To the extent that climate change will manifest itself as moderate changes in variability or extremes, we argue that existing water resources infrastructure and institutional arrangements provide a solid foundation for coping with climate change impacts, and that the mandates of existing water resources policy and water resources management institutions are at least consistent with the fundamental objectives of climate change adaptation. A deeper inquiry into the underlying nature of PNW water resources systems, however, reveals significant and persistent obstacles to climate change adaptation, which will need to be overcome if effective use of the region's extensive water resources management capacity can be brought to bear on this problem. Primary obstacles include assumptions of stationarity as the fundamental basis of water resources system design, entrenched use of historic records as the sole basis for planning, problems related to the relatively short time scale of planning, lack of familiarity with climate science and models, downscaling procedures, and hydrologic models, limited access to climate change scenarios and hydrologic products for specific water systems, and rigid water allocation and water resources operating rules that effectively block adaptive response. Institutional barriers include systematic loss of technical capacity in many water resources agencies following the dam building era, jurisdictional fragmentation affecting response to drought, disconnections between water policy and practice, and entrenched bureaucratic resistance to change in

many water management agencies. These factors, combined with a federal agenda to block climate change policy in the US during the Bush administration has (with some exceptions) led to institutional "gridlock" in the PNW over the last decade or so despite a growing awareness of climate change as a significant threat to water management. In the last several years, however, significant progress has been made in surmounting these obstacles, and the region's water resources agencies at all levels of governance are making progress in addressing the fundamental challenges inherent in adapting to climate change. © 2010 Author(s).

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES), Other Climate Scenario

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1, SRES B1

Other Climate Scenario: A1B

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Policymaker

Other Communication Audience: Water resource managers

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality, Food/Water Security, Precipitation

Geographic Feature:

resource focuses on specific type of geography

Freshwater, Urban

Geographic Location:

resource focuses on specific location

Non-United States, United States

Non-United States: Non-U.S. North America

Health Impact:



specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content